

Relationship among Biometrical Characters of Sorghum (Jowar) Hybrid

Irum Raza* and Sobia Naheed

National Agricultural Research Centre, Islamabad, Pakistan.

Abstract

The present study was designed to find correlation among yield of sorghum hybrid and its biometrical characters. Results of analysis showed that the yield and plant population were significant at 1% alpha having positive correlation. Similarly, number of green leaves and plant population were significant at 5% alpha and also positively associated. Correspondingly plant height and yield were significant at 5% alpha. Correlation analysis is a functional technique for analysing data of experiment, where scientists are interested in determining association among different variables in order to assess increase in yield.

Keywords: Biometrical characters, Correlation, Sorghum hybrid.

Introduction

Sorghum (Jowar) is one of the important kharif crops of Pakistan. It is grown under an area of 198 thousand hectares with production of 119 thousand tonnes (GOP, 2013). It is considered as staple diet for human beings as well as animal feed and industrial raw material (Mehmood et al., 2008). It gives good growth and at the same time good yield of grain and large quantity of fodder (Hussain et al., 2011).

In agriculture, scientists deal with different experiments and for the analysis of data generated from the experiments, they choose certain statistical techniques depending upon the objectives of study. Most of the time, their interest lies in finding association among different variables or the effect of one variable on the other. Therefore, a very popular tool called correlation analysis technique is used for analysing data that arise in many scientific disciplines, for instance biology (e.g., Juliá and Peris, 2010), biomedical and medical sciences (e.g., Camacho et al., 2010; Oliboni et al. 2011), earth sciences (e.g., Fontana et al., 2010; Rangel et al., 2011), social sciences (e.g., Conte et al., 2011), economics (e.g., Misztal, 2011), ergonomics (e.g., Bin et al., 2010, Zadry et al., 2011), and of course agriculture (e.g., Lakhesar et al., 2010, Bandehagh and Moghbeli, 2011, Cherati, et al. 2011, Zooleh et al., 2011, Herrero et al., 2011, Kesavacharyulu et al., 2011, Rogiers et al., 2011).

Crop scientists are also interested in studying the relationship between those biometrical characters which have positive effect on the yield of crop. For this purpose, they use different statistical techniques, such as, correlation and regression

analysis. Literature also shows some other examples with regards to correlation analysis, such as, in groundnut by Izge et al. (2004); in sorghum by Ezeaku and Mohammed (2006); in pear millet by Izge et al. (2006) and in pea by Togay et al. (2008). The strength of relationship between yield and its component variables is easily determined by correlation technique.

Keeping in view its importance in the field of agriculture, the present study focuses on determining association among the biometrical characters of sorghum hybrid, such as, plant population, plant height, number of green leaves and yield.

Methodology

In this study, data on biometrical characters of sorghum hybrid (46 genotypes), such as, plant population, plant height, number of green leaves and yield were collected through a pilot sample survey from sorghum programme NARC. The aim of this study was to find out the relationship among the biometrical characters by using correlation analysis technique in Minitab Software (2007). Correlation coefficient or correlation is also termed as Pearson product moment coefficient of correlation for pairs of variables. P-value was also determined to test whether the correlation coefficients are zero or not. The general form of Pearson Correlation Coefficient as suggested by Mead (2002) is given below.

The correlation coefficient value lies between -1 and +1. If one variable tends to increase as the other decreases, the correlation coefficient is negative. Conversely, if the two variables tend to increase together the correlation coefficient is positive

(Cohen, et al. 2013).

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$$

Where:

- N = number of pairs of scores
 $\sum xy$ = sum of the products of paired scores
 $\sum x$ = sum of x scores
 $\sum y$ = sum of y scores
 $\sum x^2$ = sum of squared x scores
 $\sum y^2$ = sum of squared y scores

Results and Discussion

The correlation coefficients obtained from correlation analysis are summarised in Table 1. Significant and positive correlation was found between the variables yield and plant population as p-value is less than 0.01. Similarly, number of green leaves and plant population are positively associated having p value less than 0.05. The same results were attained for the variables yield and plant height. Number of green leaves and yield are also significant at 10% alpha.

Correlation analysis technique has been applied by different studies, such as, Khatun et al. (1999) found that grain yield plant-1 was positive and significantly correlated with number of kernels ear-1, ear weight and ear insertion height. High correlation of grain yield with plant height is also reported by other researchers (Annapurna et al., 1998; Gautam et al., 1999). The relationship between seedling emergence and number of grains ear-1 was also positive and significant, indicating that early emergence genotypes could result in increased number of grains ear-1 and consequently increase grain yield. Bello and Olaoye (2009) also used correlation analysis technique for finding association among maize yield and other agronomic characters.

Literature also shows other examples of correlation coefficient technique in agriculture. For instance a survey was conducted to analyse the farmers' attitude towards the use of traditional and modern irrigation methods in the region of Tabuk. The results of correlation analysis revealed that farmers' attitude regarding the use of modern irrigation methods is positive because the correlation value was significant at 1% alpha (Behnassi et al, 2014).

Table 1. Correlation Matrix showing relationship among biometrical characters of sorghum hybrid.

	Plant population	Plant height	No. of green leaves
Plant height	0.240 0.109	-	-
No. of green leaves	0.285 0.055*	0.089 0.558	-
Yield	0.386** 0.008	0.332* 0.024	0.279*** 0.061

Cell contents: Pearson correlation coefficient

P- value

where

** = Significant at 1 % α

* = Significant at 5 % α

*** = Significant at 10 % α

Conclusion

The correlation analysis technique has proven to be useful for finding association among different biometrical characters of sorghum hybrid yield. Results of analysis revealed significant and positive correlation among the variables and showed that these variables could play a vital role in increasing yield of sorghum hybrid.

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